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THESIS

THE RELATIONSHIP BETWEEN ACADEMIC MAJOR AT THE UNITED STATES NAVAL ACADEMY AND SERVICE COMMUNITY SELECTION

by

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August 1998

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ABSTRACT

This study provides information for those individuals responsible for guiding midshipmen's choice of naval service community. This research focused on individuals who received their first community choice. The analysis demonstrates that choice of academic major frequently affects the likelihood that an individual will select a particular community. For example, a shift from a group one major to a group two major significantly decreases the likelihood of selecting Marine Corps. Another finding is that a shift from group one major to either group two or group three majors decreases the likelihood of selecting submarines. The fact that it is possible to predict community choice from academic major may not be obvious to midshipmen when they choose their major during the second semester of their plebe year (United States Naval Academy, 1997).

This project was designed to provide company officers with the information needed to counsel midshipmen about the service community available following graduation from the Naval Academy. The choice of career field is the culmination of four years of hard work by midshipmen, and this decision can affect their naval service career for many years. This information needs to be provided to the people involved in the major and community selection process. This should be done prior to the midshipmen choosing their academic major.

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THE RELATIONSHIP BETWEEN ACADEMIC MAJOR AT THE UNITED STATES NAVAL ACADEMY AND SERVICE COMMUNITY SELECTION

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requirements for the degree of

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This study provides information for those individuals responsible for guiding midshipmen's choice of naval service community. This research focused on individuals who received their first community choice. The analysis demonstrates that choice of academic major frequently affects the likelihood that an individual will select a particular community. For example, a shift from a group one major to a group two major significantly decreases the likelihood of selecting Marine Corps. Another finding is that a shift from group one major to either group two or group three majors decreases the likelihood of selecting submarines. The fact that it is possible to predict community choice from academic major may not be obvious to midshipmen when they choose their major during the second semester of their plebe year (United States Naval Academy, 1997).

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TABLE OF CONTENTS

I. INTRODUCTION

A. BACKGROUND

Approximately 1.2 million people receive their undergraduate degree every year (U.S. Department of Education, 1997). Although the majority of people who attend college choose a major that best suits them, this choice can be one of the most difficult decisions a student makes. The choice of college major will have a significant impact on subsequent decisions concerning a career following graduation. The choice of a major and the subsequent choice of a career[1] chosen by military members is especially important because this decision can affect them for at least five years (minimum required obligation), or for as much as 30 years for those who remain in the military.

A considerable amount of literature concerning the relationship between personality type and occupational choice has been published (Holland, 1996). This literature demonstrates that certain personality types migrate to particular occupations. Holland's theory (1996) proposes that individuals pursue careers that match their personality type. Once a proper match is established, individuals experience

[1] As this choice is associated with obtainment of a particular military occupational specialty (MOS), the term "occupational choice" will also be employed in this analysis.

high levels of satisfaction in their chosen occupation (Holland, 1996).

Although the literature examining the relationship between personality type and occupation is considerable (Holland, 1996; Hogan, 1986), little attention has been given to military personnel, particularly military students. Studies on military students have examined leadership characteristics (Roush & Atwater, 1992) and personality types (Roush, 1989), among other topics. These studies, however, have failed to address military careers, nor have they addressed the relationship between college major and career choice in the military.

Apparently, no empirical studies addressing the link between choice of major and occupation have been conducted at any of the four military service academies (Navy, Army, Air Force, and Coast Guard). Such a study is warranted because the military academies are unique in two ways. First, the services hire all of their graduates. Second, they offer a limited range of occupational choices.

The Naval Academy, as well as other service academies, immerses their students in the military environment. This immersion is especially important for the fourth class year (freshman), when the military culture is conveyed. During the four years at the Naval Academy, each student will take 45

semester hours of professional/military courses and participate in more than 2,000 hours of practical military exposure. This exposure reinforces the theories presented in the classroom. Athletics are also emphasized during these four years.

Athletics are available via several programs, including 29 varsity sports and 23 intramural sports. In addition, a midshipman has access to an ice rink and bowling alley. These athletic events teach teamwork and leadership and promote physical fitness while at the Naval Academy and throughout an individual's career (United States Naval Academy, 1998).

The personality type of individuals entering the Naval Academy is well-documented (Roush & Atwater, 1992). Students predominantly display the personality type "Extroverted, Sensing, Thinking, and Judging" (ESTJ), as measured by the Myers-Briggs type indicator (Myers & McCaulley, 1985). ESTJs are described as "assertive, practical, rational, loyal, opinionated and decisive" (Shehan, 1997).

Research using other personality measures have validated these findings. Using the Hogan personality inventory (Hogan, 1986), the typical midshipman at the Naval Academy was described as "approachable, outgoing, and flexible, who enjoys change and finding new ways to solve problems and who doesn't mind confronting conflict" (Lall, 1998, p. 7). Although the

wording in this research may differ slightly from the ESTJ profile, Lall's summary essentially describes a similar type of person (1998).

There are two primary reasons for this homogeneity among students. The first is self-selection. Only a select few even apply for admittance to the United States Naval Academy. The second is the admission process itself. The admissions board has strict standards and screening criteria. These standards and criteria ensure that only those students who are likely to succeed are offered admission into the Naval Academy. To illustrate this selectivity, of the 10,119 applicants in 1999, only 1,447 were offered admission. Of this number, 1,175 were admitted (United States Naval Academy, 1997).

B. SCOPE

This study examined the relationship between choice of college major and choice of occupation in the Navy. Only the primary warfare communities were considered: Aviation (naval flight officer [NFO] and pilot); Submarine Warfare; Surface Warfare, nuclear and conventional, (SWON and SWO); and the Marine Corps (Aviation and Ground Forces). The remaining communities were not evaluated due to the limited number of students who select these occupations.

C. METHODOLOGY

The design used an archival review of pre-existing data sets. A statistical assessment of the data sets was evaluated on several levels. These data sets contain information on actual service assignments from the graduating classes of 1997 and 1998. Service assignment occurs when the midshipman is assigned to their future warfare community (occupation). The process of service assignment is detailed in Chapter II.

D. ORGANIZATION

This study is divided into five chapters. Chapter I is a overview of this study touching on the areas that will be discussed in later chapters and has already been presented. A review of the pertinent literature related to occupational choice and general information about the United States Naval Academy is presented in Chapter II. Chapter III provides a description of variables examined in this study. Chapter IV reviews the study's methodology and findings of each hypothesis test. Chapter V provides conclusions and offers recommendations based on the findings.

E. PURPOSE

The purpose of this study was to determine the relationship between a midshipman's academic major and his or her subsequent occupational choice.

II. BACKGROUND AND LITERATURE REVIEW

A. INTRODUCTION

This study focused on the career selections made by midshipmen following their four years at the Naval Academy. However, all midshipmen make several decisions while attending the Naval Academy that have later ramifications. Once students complete their fourth (freshman) class year, they make two decisions that will affect their life for the next three to nine years.

First, at the end of the fourth (freshman) class year, they decide which major to pursue. Although each individual has input concerning his or her major, the decision is ultimately determined by the Naval Academy[2] (United States Naval Academy, 1997). Each midshipman submits his or her preference of major. The Academic Dean then assigns an individual a major based on personal preference, resources available, and the needs of the Navy.

Second, a midshipman decides which occupation to pursue. Again, a preference is submitted and an assignment made. The factors involved in this decision are far more complex than those of choosing a major. These factors include an individual's performance, both academically and

professionally, personal preference, the needs of the Navy, and medical suitability.

B. ACADEMICS

1. General

Unless previously waived,[3] all freshmen are required to take the same required courses. The required courses are designed so that each person has the necessary foundation to choose between 18 different majors. This practice prepares all graduates to enter most of the technically demanding occupational fields in the Navy, including nuclear power. Fourth (freshman) class year academics include history, English, math (calculus), physics, chemistry, and naval science. The third class year for midshipmen majoring in areas other than engineering includes two additional engineering courses in conjunction with the remaining basic requirements not accomplished during the fourth (freshman) class year.

2. Majors

The 18 majors are divided into functional areas for administrative purposes. These divisions or groups are similar to civilian universities or colleges. Group one is similar to the College (or School) of Engineering. Group two is similar

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[2] In recent years, the process is more of a screening than an assignment of major.

to a combination of two colleges: math and science. Group three is similar to those colleges focusing on the social sciences and humanities.

a) Group One

Group one majors include all the traditional engineering disciplines (aerospace, electrical, mechanical, and systems). Some nontraditional majors not found at all engineering schools are also included in group one. These majors include general, marine, ocean engineering, and naval architecture.

b) Group Two

Group two majors comprise the following: chemistry, computer science, oceanography, general science, mathematics, and physics.

c) Group Three

Group three majors include economics, English, history, and political science.

C. GRADING SYSTEM

The grading system at the Naval Academy is similar to a civilian university, in that each student receives traditional grades. It differs, however, in that each student is graded in

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[3] Some students attend other institutions before attending the United States Naval Academy.

the additional areas of military and professional development. Each of these grades is weighted and combined to determine the student's final standing (United States Naval Academy, 1996).

1. Academic Order of Merit

Academic order of merit (AOOM) is based on a cumulative quality point rating (CQPR) system (United States Naval Academy, 1997). The CQPR is equivalent to the grade point average (GPA) system found in most universities. This CQPR is based on academic (nonprofessional) courses (United States Naval Academy, 1996). In order for a midshipman to graduate, he or she must have a minimum 2.0 CQPR.

2. Military Order of Merit

Military order of merit (MOOM) is based on the cumulative professional/military quality point rating (MQPR) (United States Naval Academy, 1996). The MQPR is divided into the following areas: physical education, athletic performance, military performance, military conduct, and grades received from professional development courses (United States Naval Academy, 1996).

3. Overall Order of Merit

Overall order of merit (OOOM) consists of the AOOM and MOOM for each person. The AOOM is approximately 65% of the

OOOM; the MOOM is approximately 35% (United States Naval Academy, 1996).

D. SERVICE ASSIGNMENT

1. Factors

Service assignment is the complex task of assigning occupation to approximately 1,000 midshipmen. The factors weighed by the Service Assignment Committee include personal preference, OOOM, and a personal interview.

a) Preference

Each graduating midshipman submits a preference sheet for the occupation he or she desires. The preference sheet allows an individual to list up to six career fields or warfare communities in order of preference.

b) Overall Order of Merit

Overall Order of Merit (OOOM) is calculated by combining AOOM and MOOM for each individual.

c) Personal Interview

A board of three to five officers interviews each midshipman. The board forwards their recommendation to the Service Selection Committee based on the midshipman's performance.

2. Service Selection

The Service Selection Committee reviews the preference sheet, OOOM, and the recommendations from the interview board. Armed with this information and data supplied from Bureau of Naval Personnel (BUPERS), initial assignments branch, midshipman are assigned occupations. More than 90% of midshipmen in the classes of 1997 and 1998 received their first choice of occupation.

E. WARFARE COMMUNITIES

All warfare communities are represented at the Naval Academy. The major communities include Aviation Warfare, Surface Warfare, Submarine Warfare, and the Marine Corps.

1. Aviation

The aviation community includes naval aviators[4] (pilots) and naval flight officers (NFOs). The initial training for both is conducted at Aviation Preflight Indoctrination (API) in Pensacola, FL.

The pilots' and NFOs' pipelines split after this training when they report to their respective training squadrons. The pilots' primary and advanced training pipelines last approximately 18 to 24 months, depending on aircraft. NFOs'

[4] The term aviator is also commonly used when referring to both pilots and NFOs as a group.

primary and advanced training last approximately 12 to 18 months, again depending on aircraft (United States Naval Academy, 1998).

2. Surface

Surface Warfare Officers (SWOs) attend Surface Warfare Officers School (SWOS) in Newport, RI. This training prepares SWOs to become division officers, and also provides training on topics such as operations, combat systems, and engineering (United States Naval Academy, 1998). Following this initial tour, which lasts approximately 24 months, conventional and nuclear power SWOs separate.

Conventional SWOs are assigned to their second ship or tour. On this ship, they are assigned to a department different from those during their previous tours. Nuclear SWOs report to nuclear power school and prototype; this training lasts approximately one year. Following training, nuclear SWOs report to nuclear-powered ships.

The progression of each type of SWO, following the divergence of these two paths is similar with the exception of the type of ship assigned. However, the Commanding and Executive officer tours for nuclear-trained officers are on conventional ships (United States Naval Academy, 1998).

3. Submarine

The training pipeline for submarine officers begins with Nuclear Power School followed by prototype. Prototype is a land-based environment in which students operate a nuclear power plant.

Upon completion of this training, the officers attend Submarine Officer Basic Course in New London, CT. This phase of training emphasizes basic submarine control, tactics, and systems, as well as prepares junior officers to become division officers (United States Naval Academy, 1998).

Following training, officers are assigned to their first submarines. During the initial 12 to 18 months, the officers will earn their dolphins, signifying that they have obtained their ships' qualifications and are now trusted members of the crew. Dolphins also signify acceptance into the "Silent Service" (submarine).

4. Marine Corps

Following graduation, all marine officers attend The Basic School (TBS) in Quantico, VA. The emphasis of this school is to provide all the newly commissioned officers with "Marine esprit, develop officer leadership and prepare them to assume the duties of a company grade officer" (United States Naval Academy, p. 1, 1998).

Following TBS, officers are assigned a military occupational specialty (MOS). Subsequent training and assignments depend on the MOS. These occupations range from aviation to infantry (United States Naval Academy, 1998). The Marine aviators complete flight school with their Navy counterparts. The personnel in other occupational specialties attend training programs concordant with their MOS.

When combined, the warfare communities comprise the majority of the naval forces. Naval forces are then combined with the remaining armed forces, providing for the security of the nation. Regardless of which branch of the service or which career field military men or women select, they must understand how their mission supports the defense of the United States.

F. RELATED STUDIES

There is a substantial amount of research literature evaluating the relationship between college major and occupational choice (Holland, 1996; Hogan, 1986). However, there is no research concerning the military academies in this area. The current literature focuses primarily on the fit between personality type and occupations. The individuals conducting this work include Holland, Hogan, and Jung, among others.

Many authors have tried to capture the importance of these theories. Perhaps the best-known version of these theories and the associated test is the Myers-Briggs indicator (MBTI). This test was developed by Katherine Briggs and Isabel Meyers. Meyers and McCaulley established the industry standard when they operationalized Jung's work to create the MBTI (Meyers & McCaulley, 1985).

Paul Roush (1989,1992,1997) applied the concepts developed by Meyers and McCaulley to the Naval Academy. He used the MBTI to evaluate the personality type of midshipmen. Roush used the MBTI to investigate several issues at the Naval Academy such as feedback systems and the willingness to change, voluntary attrition and understanding transformational leadership. In his first article, Roush conducted a study of midshipmen focusing on the 360-degree feedback system instituted at the Naval Academy (1997). During this study, he concluded that the Naval Academy was an "ESTJ"[5] institution (Roush, 1997). Again, a person with an ESTJ personality type is typically "practical, realistic, matter-of-fact, with a natural head for business or mechanics" (Noe, Hollenbeck, Gerhart, and Wright, 1997, p. 392). These individuals also are "not interested in subjects they see no use for" (Noe, et

[5] I = introverted, S = sensing, T = thinking, P = perceptive, J = judging, N = intuitive, E = extroverted, and F = feeling.

al., 1997, p. 392). ESTJs also like to "organize and run activities" (Noe, et al., 1997, p. 392).

Roush's second article examined the voluntary attrition rate at the Naval Academy (1997). This study evaluated the personality characteristics of midshipmen who voluntary dropped out of the Naval Academy during the first semester of their fourth class (freshman) year. The data consisted of MBTI personality types of those individuals in the classes of 1991 and 1992. Roush concluded that certain personality types tend to leave the Naval Academy (1989). This study showed that for the class of 1991, "INFJ, INFP, ISFP and ENFPs" were most likely to leave. For the class of 1992, "ESFJ and ENFPs" were most likely to leave before graduation. Again, individuals with the ESTJ personality type were most likely to stay (Roush, 1989). One implication of this study is that midshipmen who are introverted, intuitive, feeling and perceptive may need to either create an "ESTJ" façade during their tenure at the Naval Academy, or find another institution that is compatible with their type.

His last article investigated transformational leadership and self-perception. For this study, he focused on midshipmen that were assigned as plebe detailers.[6] The detailers were

[6] Plebe detailers are individuals that are upperclass midshipmen that have been selected to train the fourth class midshipmen during indoctrination.

administered the MBTI prior to the beginning of training. This data was then compared with the information provided by the fourth class midshipmen (subordinates) concerning transformational and transactional leadership traits (Roush & Atwater, 1992). This study noted that those individuals with the "sensing and feeling" aspects on the MBTI tend to be rated higher or considered more transformational by subordinates than other MBTI types (Roush & Atwater, 1992). Individuals with a "sensing" personality type utilize both objective (facts and details) and subjective (intuitive) processes in their decision making practices (Noe, et al., 1997, p. 391).

Lall (1998) conducted a second line of research on the personality type of midshipmen. His findings are similar but the language is slightly different. Lall used the "Big Five" theory of personality rather than the MBTI theory and nomenclature (Fujita, 1996). Lall's research essentially reinforces the findings and claims of Roush: the Naval Academy is an "ESTJ" institution. His research shows that a "midshipman is a midshipman;" there are only slight differences when factoring in class standing, but overall midshipmen are a highly homogeneous group (Lall, 1998).

III. DATA ANALYSIS

A. BACKGROUND

The Naval Academy service assignment began with the class of 1995. Prior to 1995, individuals selected their future career based on their Overall Order of Merits (OOOM). The Naval Academy changed this process following a review of service selection procedures. Since the change from service selection to service assignments, the Professional Development Department[7] has been charged with the collection and tracking of all data concerning service selection. The data from year groups 1997 and 1998 is computerized[8] and is the basis for this evaluation. Prior to these two years, the information available is inconsistent.

The variables used for this evaluation include academic major, class standing, gender, occupational preference and occupational assignment. The data is organized and presented in two distinct ways. The first is the detailed data set, which is available at the level of detail mentioned before. The second is the aggregated data. The aggregate data is the product of combining like terms into categorical variables and combining such occupational fields as pilot and naval flight

[7] The point of contact for these data sets is Ms. Agnes Miller. The older data sets are available from Major Murphy.

officer into one category called aviation. This aggregation was performed for two reasons. First, the data is limited in several categories. For example, the number of female Marine aviators who received their degree from a group one major is limited. Second, the software is limited. The multinomial logit regression procedure is only capable of handling a combination of ten dependent and independent variables (SPSS, 1997).

B. ASSUMPTIONS

This evaluation of the graduating classes of 1997 and 1998 is limited to those individuals who entered the United States Navy or Marine Corps and received their first choice of occupation. The Naval Academy's graduates have several options of commissioning source. The students who are from foreign navies receive their commission from their own countries. The students from the United States (including territories) also have the choice to receive their commission from the Army and Air Force.

As shown in Table 3-1, the graduates that entered the Navy or Marine Corp received their first choice of occupation more than 90% of the time.

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[8] The database native format is Paradox. The data was imported into SPSS for all analysis and recoding.

Table 3-1 Choices Granted for the Classes of 97 and 98

Choices Granted for the Classes of 97 and 98

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First choice	1666	90.7	91.0	91.0
	Second choice	114	6.2	6.2	97.3
	Third choice	36	2.0	2.0	99.2
	Fourth	7	.4	.4	99.6
	Fifth	5	.3	.3	99.9
	Last	2	.1	.1	100.0
	Total	1830	99.7	100.0	
Missing	9	6	.3		
Total		1836	100.0		

However, those individuals who did not receive their first choice require additional analysis. These individuals are represented across the brigade with respect to overall order of merit as shown in Table 3-2. The table is a crosstabulation of individuals that did not receive their first choice and their overall order of merit segmented by quartile. The variable NOTFIRST equals zero if individuals received their first choice and one otherwise.

Table 3-2 Crosstabulation of Individuals Not Receiving First Choice

Crosstabulation of individuals that did not recieve their first choice of career

Class				OOOM by Quartile				Total
				1	2	3	4	
1997	NOTFIRST	.00	Count	225	219	218	193	855
			% of Total	24.2%	23.6%	23.5%	20.8%	92.1%
		1.00	Count	7	13	14	39	73
			% of Total	.8%	1.4%	1.5%	4.2%	7.9%
	Total		Count	232	232	232	232	928
			% of Total	25.0%	25.0%	25.0%	25.0%	100.0%
1998	NOTFIRST	.00	Count	215	216	209	177	817
			% of Total	23.7%	23.8%	23.0%	19.5%	90.0%
		1.00	Count	11	12	18	50	91
			% of Total	1.2%	1.3%	2.0%	5.5%	10.0%
	Total		Count	226	228	227	227	908
			% of Total	24.9%	25.1%	25.0%	25.0%	100.0%

Table 3 presents an analysis of individuals who did not receive their first choice of occupation.

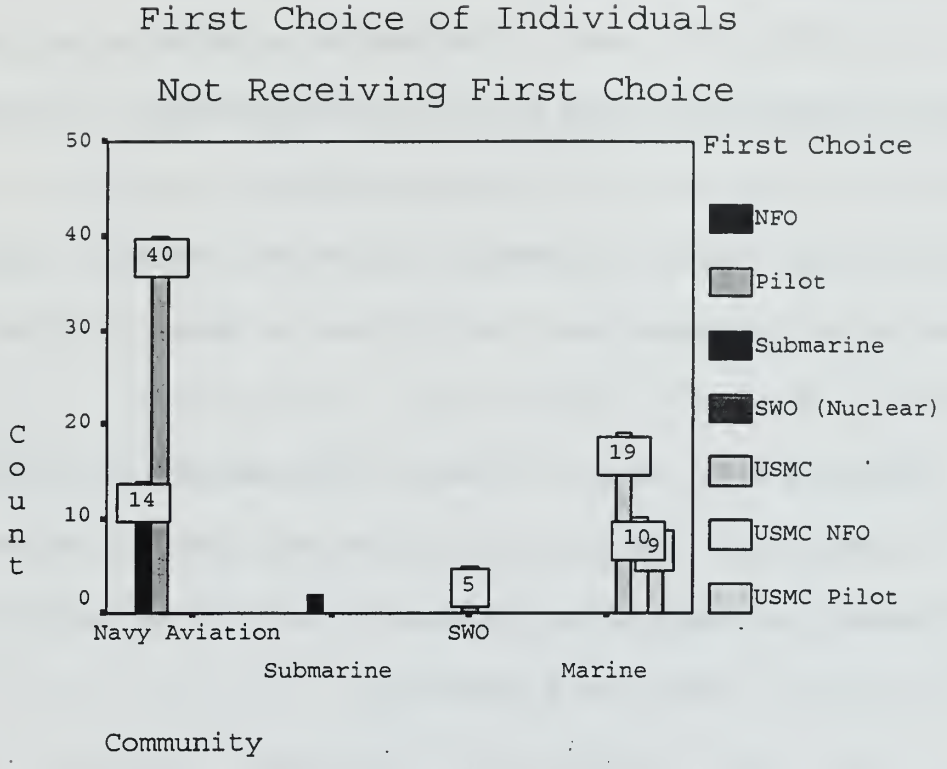

Figure 3-1 First Choice of Individuals Not Receiving First Choice

The majority of individuals who did not receive their first choice were seeking aviation billets, followed closely by Marines and then by SWO and Submarine.

As mentioned earlier, this study focused on those individuals that received their first choice, but the issue of the communities obtained by other midshipmen needs further analysis.

C. DISAGGREGATED DATA

The data displayed in this section includes the graduates that entered the United States Navy and Marine Corps whether or not they received their first choice.

The variables included are academic majors (by group), community or career field selection, gender, order of merit (overall, academic, and military), and class.[9]

The academic major variable includes the following:

Group One - includes all of the engineering majors. These are aerospace, electrical, general, marine, mechanical, naval architecture, ocean, and systems.

Group Two - includes the following: chemistry, computer science, general science, mathematics, oceanography, and physics.

Group Three - includes the following: economics, English, history, and political science.

The following constitute the community (COMM) variable:

Aviation - includes both Navy pilots and naval flight officers (NFO).

Submarine - includes officers selecting the submarine career field.

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[9] Due to software limitations, academic majors have been aggregated into the respective groups that coincide with the Naval Academies' administrative grouping.

Surface Warfare Officer (SWO) - includes both nuclear and conventionally trained officers.

Marine - This variable includes all individuals selecting Marines, including pilots and NFOs.[10]

Additionally, gender was included in the regressions:

Gender - male and females are represented by this variable.

The crosstabulation shown in Table 3-3 examines the relationship between academic group, gender, and class. These crosstabulations are calculated for all midshipmen whether or not they received their first choice of career field.

Table 3-3 Crosstabulation of Gender \ Group \ Class

Crosstabulation of GENDER \ GROUP \ CLASS

CLASS				GROUP 1	GROUP 2	GROUP 3	Total
1997	GENDER	Female	Count	*37*	*34*	*40*	*111*
			% of Total	*4.0%*	*3.7%*	*4.3%*	*12.0%*
		Male	Count	*404*	*173*	*240*	*817*
			% of Total	*43.5%*	*18.6%*	*25.9%*	*88.0%*
	Total		Count	*441*	*207*	*280*	*928*
			% of Total	*47.5%*	*22.3%*	*30.2%*	*100.0%*
1998	GENDER	Female	Count	*38*	*43*	*56*	*137*
			% of Total	*4.2%*	*4.7%*	*6.2%*	*15.1%*
		Male	Count	*312*	*185*	*274*	*771*
			% of Total	*34.4%*	*20.4%*	*30.2%*	*84.9%*
	Total		Count	*350*	*228*	*330*	*908*
			% of Total	*38.5%*	*25.1%*	*36.3%*	*100.0%*

[10] The aviation potion of the Marines was aggregated with the remaining Marine Corp communities due to the small numbers in the aviation community particularly when evaluating the females.

A close inspection of Table 3-3 reveals that females are represented in each of the three academic groups. In addition, the total female population increased by 3.1%, from the class of 1997 (12.0%) to the class of 1998 (15.1%).

D. AGGREGATE VARIABLES

Table 3-4 summarizes the variables obtained during the aggregation procedure.

Table 3-4 Variable Explanation

Variable Description	
Variables	Description of the variable code
Community	Aviation = 1 Submarine = 2 SWO = 3 Marine = 4
Group	Group 1 = 1 Group 2 = 2 Group 3 = 3
Gender	Female = 1 Male = 2
Class	1997 = 1 1998 = 2
AOOM	1 - 979
MOOM	1 - 980
OOOM	1 - 965

E. DATA ON INDIVIDUALS WHO RECEIVED FIRST COMMUNITY CHOICE

Unless otherwise noted, all subsequent data, graphs, and figures exclude those individuals who did not receive their first choice of career field.

Table 3-5 represents academic group and the career field individuals chose.

Table 3-5 Crosstabulation of Community \ Group \ Class

Crosstabulation of Community \ GROUP \ CLASS

CLASS				GROUP 1	GROUP 2	GROUP 3	Total
1997	Community	Navy Aviation	Count	159	68	95	322
			% of Total	20.2%	8.6%	12.0%	40.8%
		Submarine	Count	62	30	10	102
			% of Total	7.9%	3.8%	1.3%	12.9%
		SWO	Count	99	48	70	217
			% of Total	12.5%	6.1%	8.9%	27.5%
		Marine	Count	73	23	52	148
			% of Total	9.3%	2.9%	6.6%	18.8%
	Total		Count	393	169	227	789
			% of Total	49.8%	21.4%	28.8%	100.0%
1998	Community	Navy Aviation	Count	132	83	99	314
			% of Total	17.6%	11.1%	13.2%	41.9%
		Submarine	Count	63	22	10	95
			% of Total	8.4%	2.9%	1.3%	12.7%
		SWO	Count	62	47	85	194
			% of Total	8.3%	6.3%	11.3%	25.9%
		Marine	Count	39	25	83	147
			% of Total	5.2%	3.3%	11.1%	19.6%
	Total		Count	296	177	277	750
			% of Total	39.5%	23.6%	36.9%	100.0%

Figure 3-2 is a pictorial display of the data in Table 3-5. This method of analysis provides easy identification of choice patterns by community.

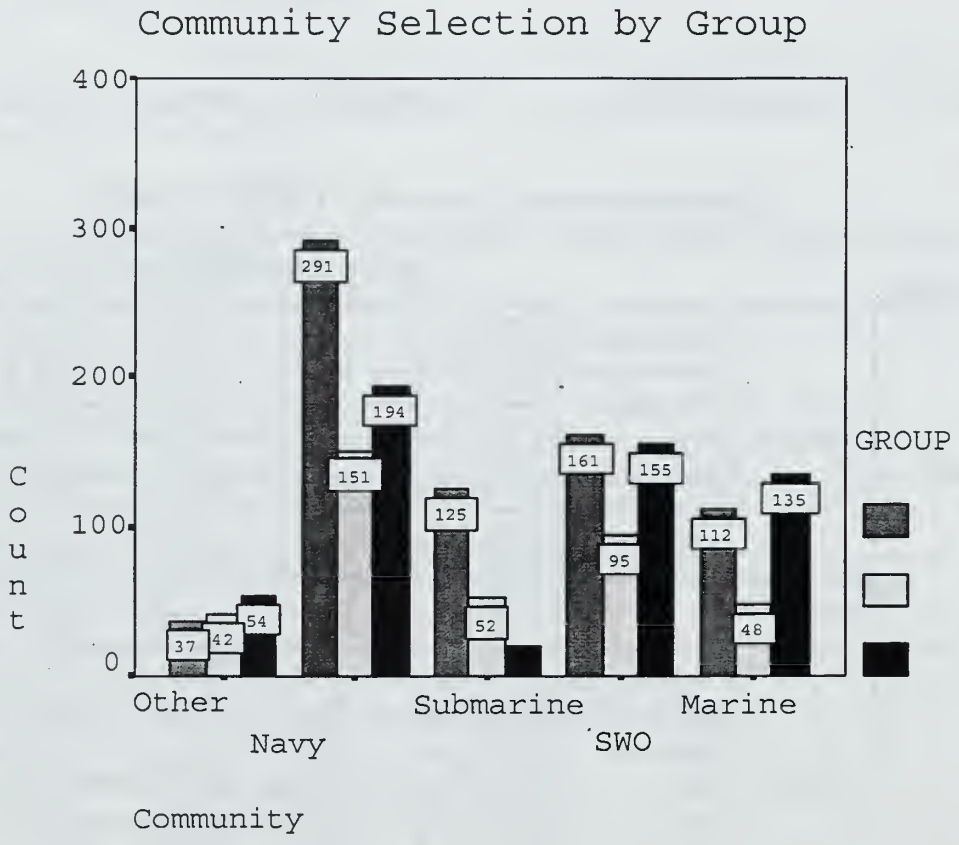

Figure 3-2 Community Selection by Group

For those receiving first choice, the community selected most often is clearly aviation, closely followed by SWO.

Figure 3-3 is the representation of community selection by gender.

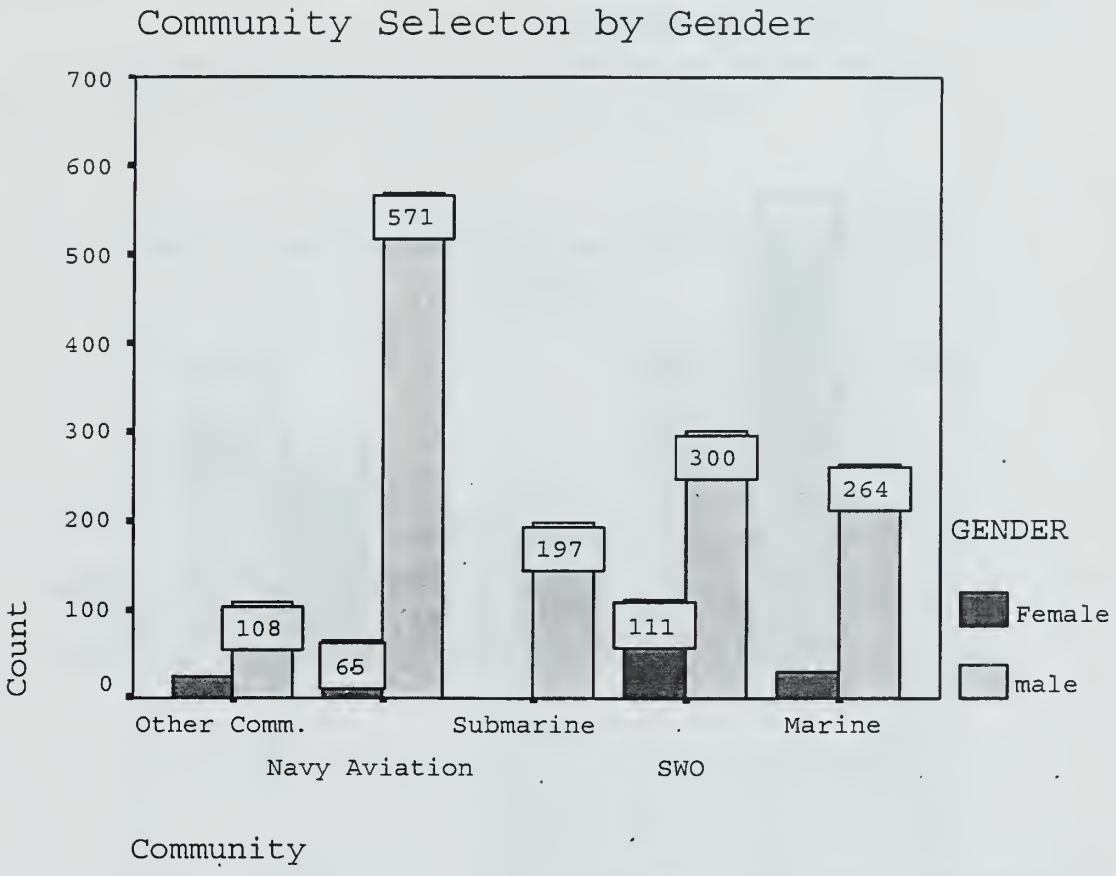

Figure 3-3 Community Selection by Gender

Again, the trends are obvious. The number of females selecting the SWO community is almost twice the number selecting aviation, the next most popular community.

Figure 3-4 pictorially displays another dimension of the information in Table 3-5. Class year is compared to academic group.

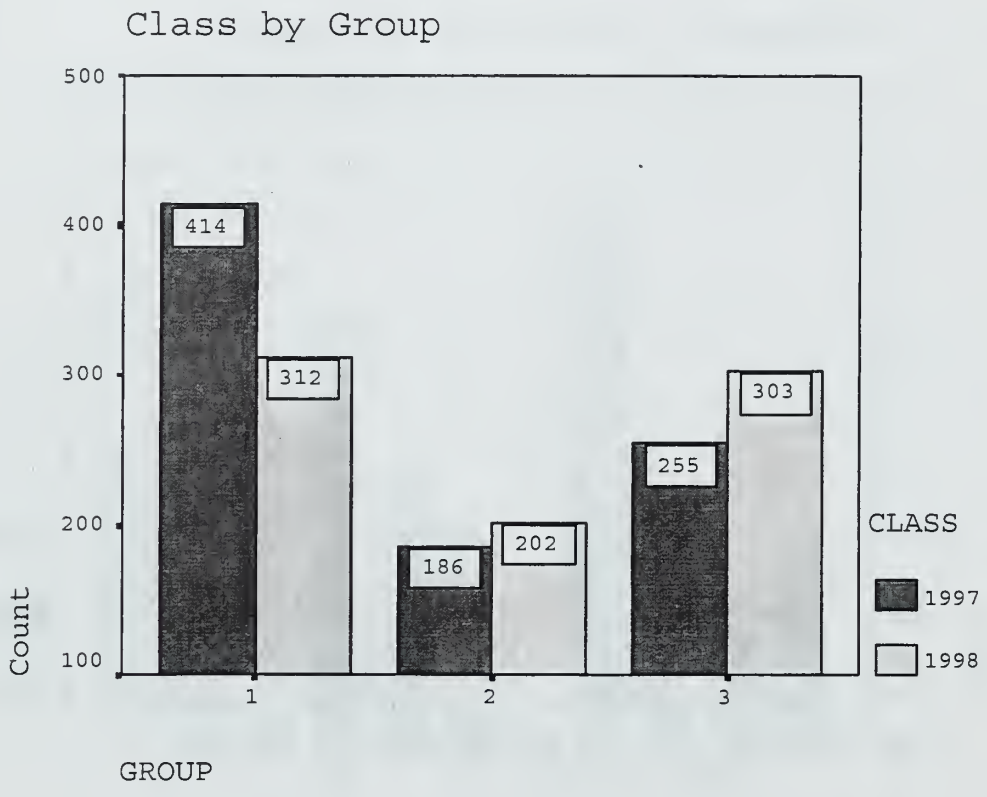

Figure 3-4 Class by Group

This figure shows a trend away from engineering. Further research is recommended in this area due to the limited number of classes included in this study.

As discussed in Chapter II, the Naval Academy curriculum is designed so that individuals in all majors are prepared to

pursue a career in any of the Navy's warfare communities. As displayed in Table 3-6, group three majors are moderately well represented in the extremely technical nuclear power communities, of submarine warfare and surface warfare (nuclear) (United States Naval Academy, 1998).

Table 3-6 Crosstabulation of Nuclear Power

Nuclear Power Crosstabulation of GROUP \ Community \ GENDER

GENDER				Community	
				Submarine Warfare	Surface Warfare (Nuc.)
Female	GROUP	1	Count		11
			% of Total		4.7%
		2	Count		8
			% of Total		3.4%
		3	Count		9
			% of Total		3.9%
	Total		Count		28
			% of Total		12.1%
Male	GROUP	1	Count	125	31
			% of Total	8.7%	2.2%
		2	Count	52	7
			% of Total	3.6%	.5%
		3	Count	20	7
			% of Total	1.4%	.5%
	Total		Count	197	45
			% of Total	13.7%	3.1%

As noted in table 3.6, 20 individuals who received their degree from a group three major entered the submarine community, and 16 entered the nuclear surface community.

Table 3-7 is a representation of the individuals that selected Navy aviation.

Table 3-7 Crosstabulation of Navy Aviation

Navy Aviation Crosstabulation of GROUP \ Community \ GENDER

GENDER				Community	
				Navy NFO	Navy Pilot
Female	GROUP	1	Count	7	18
			% of Total	3.0%	7.8%
		2	Count	5	16
			% of Total	2.2%	6.9%
		3	Count	4	15
			% of Total	1.7%	6.5%
	Total		Count	16	49
			% of Total	6.9%	21.1%
Male	GROUP	1	Count	62	204
			% of Total	4.3%	14.2%
		2	Count	32	98
			% of Total	2.2%	6.8%
		3	Count	47	128
			% of Total	3.3%	8.9%
	Total		Count	141	430
			% of Total	9.8%	29.9%

As shown in the table, almost three times as many people chose pilot rather than NFO.

Table 3-8 is a similar display. However, the focus is now on the Marine Corps.

Table 3-8 Crosstabulation of the Marine Corps

USMC Crosstabulation of GROUP \ Community \ GENDER

GENDER				Community		
				USMC	USMC NFO	USMC Pilot
Female	GROUP	1	Count	6	1	
			% of Total	2.6%	.4%	
		2	Count	5		2
			% of Total	2.2%		.9%
		3	Count	15	1	1
			% of Total	6.5%	.4%	.4%
	Total		Count	26	2	3
			% of Total	11.2%	.9%	1.3%
Male	GROUP	1	Count	52	8	45
			% of Total	3.6%	.6%	3.1%
		2	Count	26	5	10
			% of Total	1.8%	.3%	.7%
		3	Count	79	8	31
			% of Total	5.5%	.6%	2.2%
	Total		Count	157	21	86
			% of Total	10.9%	1.5%	6.0%

As discussed earlier, Table 3-8 includes cells with missing data. Females from group one did not select Marine pilot. In addition, females from group two did not select Marine NFO.

The final table for discussion, Table 3-9, is the comparison of the SWO community.

Table 3-9 Crosstabulation of Surface Warfare

SWO Crosstabulation of GROUP \ Community \ GENDER

GENDER				Community: Surface Warfare (Conv.)	Community: Surface Warfare (Nuc.)
Female	GROUP	1	Count	22	11
			% of Total	9.5%	4.7%
		2	Count	25	8
			% of Total	10.8%	3.4%
		3	Count	36	9
			% of Total	15.5%	3.9%
	Total		Count	83	28
			% of Total	35.8%	12.1%
Male	GROUP	1	Count	97	31
			% of Total	6.7%	2.2%
		2	Count	55	7
			% of Total	3.8%	.5%
		3	Count	103	7
			% of Total	7.2%	.5%
	Total		Count	255	45
			% of Total	17.7%	3.1%

The information concerning nuclear SWOs is repeated due to the relevance to the overall SWO community. One interesting point can be noted when comparing this table with the previous tables. Women are twice as likely to select SWO as they are the other warfare communities combined.

Although this chapter provides a useful picture of the data being analyzed, the primary purpose of this analysis is to systematically examine the relationships between academic group and the community selected.

The next chapter provides hypotheses and estimates relationships to shed additional light on the relationship between a midshipman's major and its effect on his or her ultimate decision of career field.

IV. METHODOLOGY

This chapter analyzes the selection of naval service community using two statistical techniques. First, a logistic model is used to explain the selection, by graduates of the classes of 1997 and 1998, of the Navy versus the Marine Corps. Next, a more disaggregate picture of community selection is obtained using multinomial logit regression. This method permits the analysis of polytomous models when more than two outcomes are possible. As indicated in Chapter III, only the data for individuals receiving their first choice are analyzed.

A. LOGISTIC REGRESSION MODEL

This technique is appropriate when the dependent variable is dichotomous. For those individuals receiving their first choice, the dependent variable equals 1 if the individual selects Marine Corps and 0 if the Navy is selected. The model, therefore, investigates the likelihood of obtaining the Marine Corps as his or her first choice. A representation of the logistic model is as follows (Pindyck & Rubinfeld, 1991, p. 259):

(4-1) $$\log (P_i/1-P_i) = \alpha + \beta X$$

Log (Pi/1-Pi) is the log of the odds of receiving the Marine Corps, and X represents a vector of relevant explanatory variables.

The variables used for this model are the same as presented in Chapter III and are summarized in Table 4-1

Table 4-1 Variable Explanation for Logistic Model

Variable	*Function*	*Values*
Marine	Dependent	Marine = 1 Navy = 0
Class	Independent	97 = 1 98 = 2
Gender	Independent	F = 1 M = 2
Group	Independent	Group 1 = 1, 2 = 2, 3 = 3
MOOM	Independent	1 - 980
AOOM	Independent	1 - 979

The results of this regression are displayed in Tables 4-2 and 4-3, which are direct outputs of SPSS. The columns of interest in Table 4-2 are the Wald test and significance. Along with these results, the chi-square[11] output is also included.

[11] The Chi-square test measures the overall goodness of fit of the model. The null hypothesis for this test is that all regression coefficients equal zero. The result of the chi-square test is in Table 4-3.

Table 4-2 Logistic Regression Results

Variable	B	Wald	Sig
GROUP		26.8958	.0000
GROUP(1)	-.5868	16.3217	.0001
GROUP(2)	-.8332	20.3573	.0000
MOOM	-.0003	.5743	.4486
AOOM	.0002	.2640	.6074
CLASS(1)	-.0270	.0425	.8367
GENDER(1)	-.4102	3.9121	.0479
Constant	-1.0288	36.0000	.0000

Note: The Wald statistic approaches the t^2 as the sample size gets larger.

Table 4-3 Chi-square Results

Chi-square Results	
Chi-square	31.186
N	1670
Significance	.0000

Note: The significance is to the fourth decimal place.

The Wald test and the significance columns suggest that both group one and two are highly significant ($p < .01$). This indicates that other things equal, Marines are more likely to originate from one of the group three majors. It is also interesting that the choice of naval service is not

significantly related to Military Order of Merit (MOOM) or Academic Order of Merit (AOOM). Gender is statistically significant at the $p < .05$ level. Other things equal, females are less likely to pick the Marine Corps.

B. MULTINOMIAL LOGIT

Multinomial LOGIT regression is the preferred method for evaluating models that have more than one possible choice. This model takes into account that the dependent variable (Community) is categorical. Additionally, each model "assumes that the logarithm of the odds of one choice relative to the second is a linear function" (Pindyck & Rubinfeld, 1991, p. 270). The multinomial LOGIT regression model can be expressed as follows:

(4-2) $$\log (P_i/P_j) = \alpha + \beta X$$

Log (Pi/Pj) equals the log of the odds selecting the i^{th} community relative to the j^{th}. Again, X is a vector of explanatory variables.

The statistical package, SPSS, however, does not directly estimate a model in the form represented by Equation 4-2. It first estimates a loglinear model, in which expected frequency counts for combinations of outcomes of categorical variables

are estimated. These combinations of outcomes constitute a "cell" in the multinomial LOGIT analysis.

In the loglinear model, coefficients are estimated for both the outcomes of the dependent variable and for the specified categorical outcomes of the interactions between the dependent variable and categorical variables. These estimated loglinear coefficients are examined for significance and used to construct expected cell frequencies, which are compared with those observed in the sample.

The direct testing of hypotheses, however, such as whether a difference in academic group major affects the likelihood of a particular naval community being selected, requires a conversion of the loglinear model to a multinomial logit model. This test is accomplished with contrast variables that are used to test the relevant hypotheses.

A sequence of steps was taken to employ the multinomial logit technique. First, the regression variables used in the analysis, as noted in section B-1 are defined. Then, there is a brief discussion of how the continuous order of merit variables are handled in the model in section B-2. The specification of the coefficients of the loglinear model is addressed next in section B-3. The parameter estimates and associated significance levels of the loglinear model and the observed and expected frequencies follow in section B-4.

Finally, hypothesis testing is conducted using the contrast variables[12] in section C.

1. Regression Variables

With the exception that the dependent variable is now polytomous, the variables utilized in this regression are the same as in the logistic analysis. The dependent variable is a categorical variable that includes the Navy and Marine Corps community or career field as selected outcomes. Table 4-4 contains the variables used in the multinomial logit model.

Table 4-4 Variable Explanation for Multinomial Logit Model

Variable	*Function*	*Values*
Community	Dependent	Aviation = 1 Sub = 2 SWO = 3 Marine = 4
Class	Independent	97 = 1 98 = 2
Gender	Independent	F = 1 M = 2
Group	Independent	Group 1 = 1, 2 = 2, 3 = 3
MOOM	Independent	1 - 980
AOOM	Independent	1 - 979

2. Cell Covariates[13]

In multinomial logit analysis, the mean values of continuous variables are used for each combination of

[12] For more detailed information on the use of multinomial logit see Advanced Statistics 7.5 (SPSS, 1997).

categorical variable. For example, in one situation the community, class, group, and gender equal one.[14] This combination of outcomes defines a cell in multinomial logit regression, and for this cell, the mean values for the order of merits are AOOM_1 = 401.55 and MOOM_1 = 351.27. These averages, called cell covariates, rather than individual AOOM and MOOM, are used in the analysis.

3. Coefficient Tables

Table 4-5 defines the parameters used to estimate the loglinear regression model.

Table 4-5 Variable Information

Factor	Levels	Value
COMM	4	Community
		1 Navy Aviation
		2 Submarine
		3 SWO
		4 Marine
CLASS	2	Class
		1 1997
		2 1998
GENDER	2	Gender
		1 Female
		2 Male
GROUP	3	Group
		1 Group 1

[13] Order of Merit issues cannot be addressed at this time due to software limitations. Currently, SPSS uses the mean cell value to perform the multinomial logit.

[14] These are the aggregated outputs along with the AOOM, MOOM, and OOOM values indicated. In this case, community is aviation, class is 1997, group is one, and gender is female.

Table 4-5 Variable Information (Cont.)

```
                          2 Group 2
                          3 Group 3

Covariates
AOOM_1
MOOM_1
OOOM_1
```

The loglinear statistical method estimates coefficient values for the following categorical variable outcomes. An "x" indicates an aliased (or redundant) parameter. These parameters are set to zero.

Table 4-6 Parameter Definitions

```
 1              Constant
 2          [COMM4 = 1]
 3          [COMM4 = 2]
 4          [COMM4 = 3]
 5        x [COMM4 = 4]
 6          [COMM4 = 1]*AOOM_1
 7          [COMM4 = 2]*AOOM_1
 8          [COMM4 = 3]*AOOM_1
 9          [COMM4 = 4]*AOOM_1
10          [COMM4 = 1]*[CLASS = 1]
11        x [COMM4 = 1]*[CLASS = 2]
12          [COMM4 = 2]*[CLASS = 1]
13        x [COMM4 = 2]*[CLASS = 2]
14          [COMM4 = 3]*[CLASS = 1]
15        x [COMM4 = 3]*[CLASS = 2]
16          [COMM4 = 4]*[CLASS = 1]
17        x [COMM4 = 4]*[CLASS = 2]
18          [COMM4 = 1]*[GENDER = 1]
19        x [COMM4 = 1]*[GENDER = 2]
20          [COMM4 = 2]*[GENDER = 1]
21        x [COMM4 = 2]*[GENDER = 2]
22          [COMM4 = 3]*[GENDER = 1]
23        x [COMM4 = 3]*[GENDER = 2]
24          [COMM4 = 4]*[GENDER = 1]
```

Table 4-6 Parameter Definitions (Cont.)

25	x	[COMM4 = 4]*[GENDER = 2]
26		[COMM4 = 1]*[GROUP = 1]
27		[COMM4 = 1]*[GROUP = 2]
28	x	[COMM4 = 1]*[GROUP = 3]
29		[COMM4 = 2]*[GROUP = 1]
30		[COMM4 = 2]*[GROUP = 2]
31	x	[COMM4 = 2]*[GROUP = 3]
32		[COMM4 = 3]*[GROUP = 1]
33		[COMM4 = 3]*[GROUP = 2]
34	x	[COMM4 = 3]*[GROUP = 3]
35		[COMM4 = 4]*[GROUP = 1]
36		[COMM4 = 4]*[GROUP = 2]
37	x	[COMM4 = 4]*[GROUP = 3]
38		[COMM4 = 1]*MOOM_1
39		[COMM4 = 2]*MOOM_1
40		[COMM4 = 3]*MOOM_1
41		[COMM4 = 4]*MOOM_1

4. Parameter Estimates

Using the information provided in Tables 4-5 and 4-6, the regression output shown in Table 4-7 can be interpreted. Parameter 26 can be considered as an example. Community equals one, which represents aviation, and the group equals one, which consists of engineering majors.

Table 4-6 shows that the aliased parameters have a coefficient value equal to zero. The Z statistic is also provided. The Z value can be converted to a significance level in the conventional manner. For example, if the Z value is greater than approximately 1.96 in absolute value, the null

hypothesis that the value of the population's parameter value equals zero can be rejected at the .05 significance level.

Table 4-7 Parameter Estimates

Parameter Estimates		
Constant	Estimate	Z-value
1	5.8598	
2	-2.6853	-2.23
3	-2.6876	-1.72
4	-.5947	-.47
5	.0000	
6	.0039	1.74
7	-.0026	-.96
8	.0035	1.79
9	.0057	3.53
10	-.0914	-.86
11	.0000	
12	-.1526	-.39
13	.0000	
14	.2818	2.39
15	.0000	
16	-1.3247	-3.47
17	.0000	
18	-2.1237	-15.66
19	.0000	
20	-17.4756	-.10
21	.0000	
22	-1.3149	-5.54
23	.0000	
24	-2.3106	-11.30
25	.0000	
26	.6348	3.59
27	-.1468	-1.17
28	.0000	
29	1.8411	6.21
30	1.0044	3.51
31	.0000	
32	-.1049	-.50
33	-.4057	-3.04
34	.0000	
35	-.2215	-1.70

Table 4-7 Parameter Estimates (Cont.)

36	-.9467	-4.71
37	.0000	
38	-.0011	-.87
39	8.542E-05	.04
40	-.005	-2.84
41	-.0081	-3.49

Note: Constant is not a parameter under multinomial assumption. Therefore, standard errors are not calculated.

Table 4-8 summarizes those parameters in which the Z value is greater than or equal to 1.96, and which are therefore insignificant at the .05 level.

Table 4-8 Summary of Significant Parameters

Parameter Number	Parameter Information
14	SWO, Class of 97
16	Marine, Class of 97
18	Aviation, Female
22	SWO, Female
24	Marine, Female
26	Aviation, Group 1
29	Submarine, Group 1
30	Submarine, Group 2
33	SWO, Group 2
36	Marine, Group 2
40	SWO, MOOM
41	Marine, MOOM

The results at this point are viewed more as an indication of the importance of combinations of the

categorical variables. They do not, however, directly provide the type of hypothesis test that needs examination.

The estimated model permits the comparison of observed and expected frequencies. The SPSS output containing this information is provided in Table 4-9.

Table 4-9 Observed/Expected

Table Information

Factor	Value	Observed Count %	Expected Count %
COMM4	Navy Aviation		
CLASS	1997		
GENDER	Female		
GROUP	Group 1	11.00 (.71)	16.19 (1.05)
GROUP	Group 2	9.00 (.58)	7.14 (.46)
GROUP	Group 3	10.00 (.65)	7.94 (.52)
GENDER	Male		
GROUP	Group 1	148.00 (9.62)	137.15 (8.91)
GROUP	Group 2	59.00 (3.83)	62.58 (4.07)
GROUP	Group 3	85.00 (5.52)	91.00 (5.91)
CLASS	1998		
GENDER	Female		
GROUP	Group 1	14.00 (.91)	13.01 (.85)
GROUP	Group 2	12.00 (.78)	10.61 (.69)
GROUP	Group 3	9.00 (.58)	10.11 (.66)
GENDER	Male		
GROUP	Group 1	118.00 (7.67)	124.65 (8.10)
GROUP	Group 2	71.00 (4.61)	70.67 (4.59)
GROUP	Group 3	90.00 (5.85)	84.95 (5.52)
COMM4	Submarine		
CLASS	1997		
GENDER	Female		
GROUP	Group 1	.00 (.00)	.00 (.00)
GROUP	Group 2	.00 (.00)	.00 (.00)
GROUP	Group 3	.00 (.00)	.00 (.00)
GENDER	Male		

Table 4-9 Observed/Expected (Cont.)

Factor	Value	Observed Count %	Expected Count %
GROUP	Group 1	62.00 (4.03)	62.00 (4.03)
GROUP	Group 2	30.00 (1.95)	30.00 (1.95)
GROUP	Group 3	10.00 (.65)	10.00 (.65)
CLASS	1998		
GENDER	Female		
GROUP	Group 1	.00 (.00)	.00 (.00)
GROUP	Group 2	.00 (.00)	.00 (.00)
GROUP	Group 3	.00 (.00)	.00 (.00)
GENDER	Male		
GROUP	Group 1	63.00 (4.09)	63.00 (4.09)
GROUP	Group 2	22.00 (1.43)	22.00 (1.43)
GROUP	Group 3	10.00 (.65)	10.00 (.65)
COMM4	SWO		
CLASS	1997		
GENDER	Female		
GROUP	Group 1	16.00 (1.04)	26.76 (1.74)
GROUP	Group 2	15.00 (.97)	11.58 (.75)
GROUP	Group 3	19.00 (1.23)	20.35 (1.32)
GENDER	Male		
GROUP	Group 1	83.00 (5.39)	70.99 (4.61)
GROUP	Group 2	33.00 (2.14)	34.02 (2.21)
GROUP	Group 3	51.00 (3.31)	53.31 (3.46)
CLASS	1998		
GENDER	Female		
GROUP	Group 1	17.00 (1.10)	13.65 (.89)
GROUP	Group 2	18.00 (1.17)	15.69 (1.02)
GROUP	Group 3	26.00 (1.69)	22.98 (1.49)
GENDER	Male		
GROUP	Group 1	45.00 (2.92)	49.61 (3.22)
GROUP	Group 2	29.00 (1.88)	33.71 (2.19)
GROUP	Group 3	59.00 (3.83)	58.36 (3.79)
COMM4	Marine		
CLASS	1997		
GENDER	Female		
GROUP	Group 1	4.00 (.26)	4.41 (.29)
GROUP	Group 2	3.00 (.19)	2.51 (.16)
GROUP	Group 3	5.00 (.32)	5.19 (.34)

Table 4-9 Observed/Expected (Cont.)

Factor	Value	Observed Count %	Expected Count %
GENDER	Male		
GROUP	Group 1	69.00 (4.48)	64.16 (4.17)
GROUP	Group 2	20.00 (1.30)	14.66 (.95)
GROUP	Group 3	47.00 (3.05)	57.07 (3.71)
CLASS	1998		
GENDER	Female		
GROUP	Group 1	3.00 (.19)	5.55 (.36)
GROUP	Group 2	4.00 (.26)	5.01 (.33)
GROUP	Group 3	12.00 (.78)	8.32 (.54)
GENDER	Male		
GROUP	Group 1	36.00 (2.34)	37.87 (2.46)
GROUP	Group 2	21.00 (1.36)	25.82 (1.68)
GROUP	Group 3	71.00 (4.61)	64.41 (4.19)

C. HYPOTHESIS TESTING

As indicated earlier, hypothesis testing is accomplished using contrast variables. Contrast variables allow the hypotheses to be tested by holding the remaining variables statistically constant while only varying the desired variables. An example of this is a contrast variable called A9798. The reference group in this case is the class of 1997, and the variable that is "contrasted" with this reference group is the class of 1998. The variable is used to test whether there are significant differences between the classes of 1997 and 1998 in terms of community or career field assigned.

The following are questions examined in this analysis using this hypothesis testing procedure:

- Is there a significant difference between the two classes with respect to service selection (A9798)?
- Is there a significant effect on the likelihood of selection to aviation if an individual changes from group two to group one (FLY21)?
- Is there a significant effect on the likelihood of selection to aviation if an individual changes from group three to group one (FLY31)?
- Is there a significant effect on the likelihood of a particular community being selected when the individual changes from group two to group one (G2G1)?
- Is there a significant effect on the likelihood of a particular community being selected when the individual changes from group three to group one (G3G1)?
- Is there a significant effect on the likelihood of selection to Marine Corps if an individual changes from group two to group one (Marine21)?
- Is there a significant effect on the likelihood of selection to Marine Corps if an individual changes from group three to group one (Marine31)?

- Is there a significant effect on the likelihood of selection to Submarines if an individual changes from group two to group one (SUB21)?
- Is there a significant effect on the likelihood of selection to submarines if an individual changes from group three to group one (SUB31)?
- Is there a significant effect on the likelihood of selection to SWO if an individual changes from group two to group one (SWO21)?
- Is there a significant effect on the likelihood of selection to SWO if an individual changes from group three to group one (SWO31)?

Other hypotheses relate to the effect of gender on community selected:

- Is there a significant effect of being female on selecting aviation (FLYGB)?
- Is there a significant effect of being female on selecting Marine Corps (MARINEGB)?
- Is there a significant effect of being female on selecting surface warfare (SWOGB)?

Table 4-10 contains the results of this testing procedure. The results are most easily interpreted using the

Generalized Odds Ratio contained in the second part of Table 4-10. If the 95% confidence interval covers the value 1.0, then the hypothesis that there is a change in the probability of the relevant outcome cannot be rejected. In other words, if the probability ratio is equal to 1.0 the null hypothesis cannot be rejected. An example is provided by the test for SWO31, which has a null hypothesis that switching from group one to group three does not change the likelihood of being assigned the SWO community. The 95% confidence level for this test is from .4296 to 2.9806. As this covers the 1.0, the null hypothesis cannot be rejected.

Table 4-10 Generalized Log-Odds Ratio

Generalized Log-Odds Ratio

Variable	Value	Wald	Sig.
A9798	1.1128	.7311	.3925
FLY21	-2.3749	26.3764	2.8E-07
FLY31	-1.7585	21.3860	3.8E-06
FLYGB	-13.0308	273.6366	.0000
G2G1	-8.5001	61.3634	4.8E-15
G3G1	-4.3184	17.8290	2.4E-05
MARINE21	-2.5272	11.4795	.0007
MARINE31	.9816	2.2663	.1322
MARINEGB	-12.4459	117.6981	.0000
SUB21	-1.7780	28.5350	9.2E-08
SUB31	-3.6651	57.9001	2.8E-14
SWO21	-1.8200	11.1727	.0008
SWO31	.1236	.0626	.8025
SWOGB	-6.0043	80.1942	.0000

Table 4-10 Generalized Log-Odds Ratio (Cont.)

Generalized Odds Ratio

Variable	Value	95% Confidence Interval Lower	Upper
A9798	3.0428	.2374	38.9995
FLY21	.0930	.0376	.2302
FLY31	.1723	.0818	.3631
FLYGB	2.192E-06	4.6801E-07	1.0264E-05
G2G1	.0002	2.4256E-05	.0017
G3G1	.0133	.0018	.0989
MARINE21	.0799	.0185	.3446
MARINE31	2.6687	.7435	9.5793
MARINEGB	3.934E-06	4.1527E-07	3.7268E-05
SUB21	.1690	.0880	.3244
SUB31	.0256	.0100	.0658
SWO21	.1620	.0557	.4710
SWO31	1.1316	.4296	2.9806
SWOGB	.0025	.0007	.0092

The null hypothesis that there is no difference in the probability of obtaining the relevant career choice is accepted for only a few of the tests. These are the tests associated with A9798, which is the contrast between classes, and MARINE31 and SWO31, which are the testing variables whether selecting the Marine Corps or Surface Warfare is affected by a shift from group one to group three.

The hypothesis concerning the likelihood of selecting the Marine Corps changing in response to a shift from academic group one to academic group three requires further analysis. The more disaggregate multinomial logit procedure is at odds with the more aggregated logit procedure discussed previously in the chapter. Earlier, using the logistic analysis, group

three majors were shown to be more likely to select the Marine Corps. Now, the multinomial logit procedure shows that, although the odds ratio has a calculated value to 2.67, which seems fairly high, the confidence band is sufficiently large that the null hypothesis that the change in the specified academic group has no effect on the likelihood of selecting the Marine Corps cannot be rejected.

One difference in the two estimation procedures is that the earlier logistic analysis controlled for gender. In the multinomial logit analysis, however, computational difficulties associated with the limited number of females selecting the Marine Corps prevent a further refinement of the Marine Corps hypothesis.

V. CONCLUSIONS AND RECOMMENDATIONS

This study will aid those interested in the relationship between academic major and naval service community. When an individual chooses his or her major, it is now possible to better predict the likelihood that a particular community will be selected. This relationship may not be obvious to individuals counseling midshipmen when they choose a major, or individuals advising midshipmen about naval service communities, or midshipmen themselves.

This project was designed to provide company officers with information to aid them in counseling midshipmen. Company officers have the particular responsibility to provide counsel during the career selection process.

A. HYPOTHESIS TESTING RESULTS

1. Logistic Regression

Logistic regression analysis indicates that the choice of Marine Corps versus the Navy shows that individuals coming from group three majors are more likely to become Marines. Females, however, are less likely to select the Marine Corps. Both military order of merit (MOOM) and academic order of merit (AOOM), are not statistically significant.

2. Multinomial Logit Regressions

A contradiction between the logistic and multinomial logit was found. The multinomial logit analysis did not show that the selection of a group three major relative to a group one major increases the likelihood of selecting the Marine Corps. However, it was not possible to refine the hypothesis test to the same level as employed in the logistic regression analysis.

In hypothesis testing, the null hypothesis in three cases is accepted for yielding the following conclusions:

- There is no effect of differences between classes in community selection.
- A shift from group one to group three does not affect the likelihood of selecting Marine Corps.
- A shift from group one to group three does not affect the likelihood of selecting surface warfare.

The null hypothesis is rejected for the remaining hypotheses and the following conclusions are obtained:

- A shift from group one to either groups two or three decreases the likelihood of selecting aviation.
- A statistical shift from male to female decreases the likelihood of selecting aviation.

- Overall, a shift from group one to either groups two or three decreases the likelihood of the individuals obtaining their current selection.
- A shift from group one to group two decreases the likelihood of selecting Marine Corps.
- A statistical change from male to female decreases the likelihood of selecting Marine Corps.
- A shift from group one to either group two or three decreases the likelihood of selecting submarines.
- A shift from group one to group two decreases the likelihood of selecting surface warfare.
- A statistical change from male to female decreases the likelihood of selecting surface warfare.

B. RECOMMENDATIONS

Two types of recommendations are made. The first type deals with Naval Academy policy; the second type provides recommendations for further research.

1. Policy

The Naval Academy needs to begin career counseling long before the first (senior) class year. In-house programs for those students that have shown an interest or promise in one or more of the communities needs to be expanded. An important first step is to open the current Career Information Program

(CIP) to all interested classes. The function of the CIP ranges from lectures to social events that are scheduled throughout the academic year. Making this program available to all midshipmen would provide a valuable source of information especially for the underclassmen and women, and would allow them to explore their desired career field from many perspectives.

The second recommendation is to institute formal career counseling that would strive to match a midshipman with his or her optimum community, so that the Navy and the individual would both benefit from the experience.

2. Further Research

Further research is recommended in several areas. First, the marginal effects of an individual's order of merit need to be evaluated using individual rather than group data. This evaluation can be accomplished when an improved multinomial logit method becomes available. In addition, in order to resolve the ambiguous results obtained in this analysis, research should be focused on the effect of major and other variables on Marine selection.

Qualitative studies could be conducted. Both survey information and intensive interviews could address the following types of questions: How many individuals pick a career because of class standing? For example, "I picked SWO

because I'm in the bottom of my class." How many individuals come to the Naval Academy not concerned about their major as long as they can obtain one particular community? The comment heard in this case might be "All I want to do is fly jets."

Finally, those individuals who did not get their first choice should be analyzed. This study may be a difficult, however, due to the small numbers of people who do not receive their first choice.

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